RESEARCH AND INNOVATION IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

Wim Lambrechts / James Hindson (editors)

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Reflections on 'committed' research into education for sustainable development: challenges and responses

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ABSTRACT
This chapter presents critical reflections on 'committed' research into education for sustainable development. The concept of education for sustainable development has implications for the delivery and content of education and for the process and practice of research into sustainable development. This in turn has consequences for theory and methodology and for the complex relationship between pedagogy and practice. Drawing upon insights from a workshop involving teaching, research and community development practitioners the chapter argues that, while education for sustainable development as a concept crosses all these boundaries, there is often a practical disconnection that can only be addressed through problem focused, action-oriented and collaborative approaches. It concludes that these approaches are underpinned by the identification, development and assimilation of the trans-disciplinary attributes that facilitate moving across, as well as between, disciplines, roles and contexts.

KEYWORDS
education for sustainable development, higher education, research, transdisciplinarity

INTRODUCTION
Society today is facing major sustainability challenges, characterised by their complexity and reluctance to succumb to clearly bounded definitions and solutions based upon 'hard' evidence (Funtowicz and Ravetz, 2003; Lemon et al., 2014; Rieckmann, 2012; Rittel and Weber, 1973). As key actors in the narratives and the

production of the 'evidence' that contribute to societal perceptions and behaviours, researchers and academics have to assume some responsibility for how those behaviours influence transitions towards more sustainable development (SD) or more specifically to the ability to navigate away from unsustainable futures (Sterling, 2004). However, worryingly in light of their role as educators, or at least as conduits for stakeholder reflection, educators are often unable to make sense of or to communicate coherently about, the complex and uncertain contexts and issues they teach about, research into and consult on. There is a disconnect between the explicable discipline and perspective based constructions, narratives and explanations of specific problem contexts and their often inexplicable, and complex, realities. While this is a problem for researchers to address it extends to the increasing demand from educationalists to have research that supports their teaching; particularly when they are addressing complex real world topics such as those linked to sustainability.

Research into Education for Sustainable Development (ESD) is aimed at improving research literacy in the educational and stakeholder communities. Jucker (2014) argues that central to this endeavour is clarity of aim, i.e. what is SD; clarity about what is effective in collaborative (social) learning and an appreciation of what pedagogic, institutional and collaborative structures need to be in place to support this.

Researching what SD might look like in a complex world is potentially a floored endeavour (Lemon et al., 2014). Once the future has been sign-posted with any confidence there is a strong possibility that individual and collective behaviour will be modified on the basis of that confidence, sometimes with counter productive outcomes. For example, if we are able to produce cheaper cars that are also more efficient and less polluting the market will grow as will the overall vehicular footprint even though the individual unit produces less carbon. This Rebound Effect (Sorrel, 2009) provides one example of a disconnect between expectation and experience and the continually changing landscape within which they occur (Allen, 2010). It also introduces the importance of understanding how complex systems emerge and the uncertainty and unpredictability associated with that emergence. This means that we have to be careful what we are exploring, explaining and anticipating when we engage in ESD and by extension when signposting sustainable futures. A more appropriate, and useful, way forward may well be to identify unsustainable futures, even if they never occur, and to generate the adaptive capacity – social, economic and ecological capital – required to avoid them. In other words to pursue social learning about, and through, systems behaviour (Wals, 2015).

These underlying challenges facing researchers, teachers and practitioners engaged in ESD related issues are invariably the unpredictable product of continually changing social, technical, economic and ecological interactions. One response to such an interpretation would be to adopt a fatalistic stance whereby we are reluctant to intervene, because nothing can be predicted with any degree of certainty. Alternatively we can assume the reductionist paradigm whereby we focus upon a specific part of a problem and assume that 'everything else is equal'. While neither fatalism or reductionism are particularly helpful with how we research 'real world' issues, it is possible to identify a number of features of complex systems that might support a 'replicable' framework or approach to understanding them; in other words, is it possible to understand complex systems systematically? To do this there is a need to acknowledge complexity and map the system out as a whole rather than trying to solve the whole problem (Sterling, 2004).

An additional key challenge facing committed or applied research for ESD is a disconnect between the range of key actors and agencies and the discrete and often poorly integrated roles that they perform. Even when academics, teachers, students, community representatives, companies and other stakeholders conform to a common vision about the future, the specific responsibilities and restrictions of their roles can mitigate against an adaptive transition that draws upon and generates, social learning (Sajeva et al., 2015). Academic researchers have to publish and generate funding, teachers have to meet curricula criteria and ensure that results are acceptable and development practitioners have to ensure that outcomes are specified and met even if the context has changed to make those targets no longer relevant. Indeed the latter challenge is generic. Where targets are put in place, whether they be for publication, exam results or community engagement the targets themselves become the focus of attention and not the reason for their installation. Publication quantity can overtake quality; passing exams supercede the quality of learning and numbers at a community event be more important than any sustainable engagement. Where targets are introduced and are linked to some form of penalty they can undermine the flexibility that is necessary to respond to the very reasons they were introduced (Lemon et al., 2010). Within the context of multiple actors and their respective roles and targets it is possible to identify a number of other factors that make an integrative research approach to ESD more problematic. These issues are introduced in the following sections.

This chapter emerged from a workshop run by the authors for the final CoDeS conference [4]. The purpose of the workshop was to explore the challenges facing researchers, teachers and practitioners engaged in ESD and particularly in the undertaking and or use of research into ESD. The participants were school and university teachers, researchers and users of research, primarily from public bodies. They also represented a wide range of national and cultural backgrounds from across Europe and the far East. The workshop was divided into two two-hour sessions each of which was initiated by short presentations from best practices. The purpose of the first session was to explore the challenges facing those undertaking, commissioning and using research into ESD and the second was oriented towards the identification of potential responses to those challenges. The chapter will broadly follow that format.

The following sections will consider some of the challenges that emerged from the CoDeS workshop and were highlighted by participants who were engaged in research into ESD related topics. Where relevant each section starts with a summary of points raised in the workshop; then expanding upon these to introduce more generic insights into how Research into ESD might develop.

ISSUES OF PLACE AND TIME

Workshop discussion:

- *There is a researcher in all of us, we are all critical thinkers in childhood, but we seem to lose this ability along the way.*
- *We need long-term research. Nowadays everything has to be done fast and in the short term.*
- *After project funding stops, there is often no follow-up.*
- *Access to the teachers: how can we generate time for them and interest from them?*
- *Introduce place-conscious pedagogy that is multidisciplinary, experimental, and intergenerational, this implies a change in perspective and in the curriculum.*

The central theme of this chapter is that ESD is dealing with complex systems and multiple actors that function at different temporal and spatial scales and, importantly, not all of which are human. The Rebound example introduced above

4 This chapter is based on the outcomes of the thematic workshop entitled "Committed research on education for sustainability", held at the final CoDeS conference 'Desiging a sustainable future through school community collaboration', May 21-23, 2014, Barcelona, Spain.

links household decisions about transport to more energy efficient vehicles, the strategies of multinational automotive organisations and climate change. While this obviously influences how we understand and communicate the issues of sustainability (e.g. see Rivoli's example of a T-Shirt, 2009) practical issues of time and place are also important in the 'act' of ESD research. The time required to explore a sustainability related issue can be in excess of that which is available for any specific, and timetabled, subject or research project. The development of cross-curricular, issue focussed, material is not only time consuming in itself but may require significant investment in developing new relationships and forms of delivery among the teaching staff. As discussed in the introduction, this investment may run contrary to the measures by which teachers are judged. For researchers and practitioners similar temporal constraints can emerge. With the former these may manifest themselves through the time required to generate cross-disciplinary working relationships and to negotiate access to stakeholders, with the latter the pragmatic focus on specific outcomes may restrict the time available to explore new approaches with researchers or other areas of practice and to undertake the reflective practice that is fundamental to this exploration.

Other more structured aspects of time are also significant constraints that have to be managed; political and financial cycles, the school timetable and working day all constrain engagement with a topic that is ongoing and emergent. The response to such time constraints may well require flexibility on the part of the individual – i.e. to be involved outside of their accepted time commitment; and on the part of organisations - to support their personnel in this more flexible approach and potentially to make resources available for this, e.g. premises for meetings.

One final aspect of time for consideration, particularly within ESD, relates to the temporal perspective that is adopted; focus on the natural environment will invariably require a longer term perspective than one on the economic and political environment which may be determined by their respective short(er) term cycles (Lemon and Green, 1996). The abillity to engage with stakeholders at specified times only (e.g. when the council offices are open, when the school governors are meeting or not at work) provides one example of how access can be socially and or physically constrained by time.

SOCIAL AND PHYSICAL ACCESS

Workshop discussion:

- *How can researchers access 'local' knowledge?*

- *Researchers need to be able to collaborate and gain access to a range of stakeholders.*
- *Researchers need to be aware of language issues: cultural, disciplinary, conceptual and contextual.*
- *They need to mediate and facilitate and to be able to communicate with a 'sense of audience'.*
- *What might a school-community collaboration pedagogy look like? How can we create local reflexive communities of learners across and between stakeholder groups – participatory design?*
- *Can educational institutions provide a venue for this collaboration?*
- *Can we re-contextualise (e.g. Ubuntu) and value traditional, indigenous knowledge; two way transfer of knowledge and the generation of connections with physically and socially isolated communities.*

Physical access is not just a question of reaching the target group or location at the appropriate time but can also involve negotiating entry to it. It may be self-evident to state that the ability to reach a study area is of particular importance when that location is geographically isolated (Liarakou et al., 2014). However access to a specific respondent or group of respondents may not be determined by geographical isolation but by their availability; this may be due to time pressure (e.g. for senior personnel in an organization) or to issues of social acceptability. For example work carried out into Indian forest management discovered on the one hand family gender issues could prevent female participation in resource management and on the other hand institutional barriers prevented the access of NGO's to government agencies (Martin and Lemon, 2001). The identification of gatekeepers who can facilitate access, or champions who are willing to negotiate it, is of particular importance here; for example access to senior management or to an isolated village may depend upon negotiations through a trusted intermediary.

Physical access is also relevant where issues of 'territory' and cultural acceptability are evident; for example, some sections of the population may be uncomfortable being interviewed in their home and may prefer a communal location while others may prefer the reverse. Cultural factors may determine which of these is acceptable and at what time, as in the Indian example above. A further consideration is that if physical access is negotiated through a gatekeeper with direct or indirect influence and power then the potential for bias has to be recognised and managed. Negotiating access for research into ESD relies upon the generation and maintenance of trust with participants and stakeholders and this in turn necessitates a cultural

awareness both as the basis for engagement (appropriate dress, language etc.) and to support analysis and explain variation between groups. Cultural criteria will manifest themselves through different perspectives on an issue and these perspectives may change as new contexts are forged and experienced.

MULTIPLE PERSPECTIVES AND THE PURSUIT OF CONSENSUS

Workshop discussion:

- *We tend to operate in disciplinary silos, but sustainable development is an interdisciplinary issue.*
- *The researcher is a member of the learning community, (s)he needs to understand the context, respect expectations and needs of stakeholders.*
- *Researchers must become familiar with teaching and learning methods that engage the whole community and appreciates the different perspectives.*

ESD calls for action-oriented and collaborative approaches in which all stakeholders can be involved in the research process (Espinet and Zachariou, 2014). This means that the involvement of stakeholders can take different forms and functions within a research process: e.g. (1) informing stakeholders about research (e.g. in a newsletter); (2) consult stakeholders (e.g. in a survey); (3) dialogue with stakeholders (e.g. in focus groups); (4) stakeholder participation (e.g. in action research) (Lambrechts et al., 2009). It is clear that the different forms of stakeholder involvement demand different levels of committment and forms of collaboration and can be linked when defining and applying quality criteria (Lambrechts, 2012).

The cultural climate in which behaviours take place invariably means that the world as it is perceived by different stakeholders does not coincide with the way that policy makers, politicians or scientists feel it should be perceived. Of course these agencies will often have an influential part to play in the creation of those perceptions. Problems, and by extension options, are defined by the perceptual space within which individuals and groups operate and while there are likely to be varied perceptions over an issue those perceptions are also likely to change through time. Society therefore reflects, and presents, a variety of different perspectives: world views, priorities, perceptions of education and interpretations of the role and value of research. Differences also occur in the experiences of, and relationships between, actors relating to a specific phenomon or issue (e.g. of researchers with students and staff, of staff with contractors, of community with school) and in the use of language, depending on the context and credibility, (technical, pedagogic, cultural, organisational, etc). The language of the classroom differs greatly from the langu-

age of the business case and the language of community development; of course each of these generic languages will also have significant variation within them and that language will change over time – increasingly mediated by the presence of technology and social media. The cultural contexts and multiple perspectives that exist among community, pedagogic and research based stakeholders can mean that we are prematurely susceptible to the lure of consensus. Dealing with the mess of everyday complexity is uncomfortable and, as suggested above, not always in line with the aims and objectives of institutions and their desire for clarity and solutions. Ongoing debates over the relative merits of positivist and reductionist models as compared with constructivist and holistic ones can drive us towards the pursuit of consensus rather than the acceptance and appreciation of difference (Lemon et al., 2014). Consensus is invariably interpreted as the place where different perspectives converge, the common ground. A more useful approach is to elicit and collate the multiple perspectives on a particular issue (e.g. transport to school – safety, carbon, convenience, parking, availability of options, pedestrian access, health) and to map these out as a whole. To define the problem, let alone a potential solution or response prior to this would be premature, particularly if we recognise that many of the perspectives and factors are interconnected – poor access and large numbers of working parents may compromise safety and the willingness of other parents to allow their children to walk to school thereby increasing the number of cars. This approach not only generates a more complex context upon which decisions have to be made, it also highlights the importance of whole system thinking and within that conceptual tools that need to be taught and assimilated such as the importance of positive feedback.

Multiple perspectives are an inevitable source of disconnection in research for, and into, ESD but they are also the source of understanding about the range of potential futures and responses to those futures. Understanding those perspectives requires an empathic capability; bringing them together to generate a qualitative narrative requires expertise in elicitation and representation, and underlying all of this resides the issue of trust.

RESEARCHER IDENTITY, CLARITY OF ROLES AND TRUST – THE GLUE TO RESEARCH INTO ESD?

Workshop discussion:

- *What is the role of the researcher: mediator, facilitator, outsider?*
- *Researchers can feel isolated because they are not a "real" teacher nor an "exclusive" researcher.*

- *There is a need to involve students and community members in evidence based research (e.g. data gathering).*
- *Avoid research that 'just takes' and does not 'replenish', add value.*
- *Guidance is necessary for dealing with the tension between doing 'my research' and the needs of stakeholders.*
- *Generate confidence within the researcher, training and stakeholder communities that 'to not have all the answers' is acceptable.*
- *Give consideration to potential bias and ethics in research.*

There was a recognition in the workshop that the role and identity of the researcher might not only be confusing for other stakeholders but for the researchers themselves; are they acting as a mediator, a mentor, a supervisor, an observer, a facilitator, an outsider, an activist or combinations of these roles? Guidance was felt to be necessary in how to deal with this tension between doing 'my research' and the needs and participation of practitioners and community stakeholders. The management of expectations is problematic when the researcher has personal and institutional targets and a 'relationship' with stakeholders. Issues of ethics are often addressed systematically but these do not necessarily deal with how expectation is addressed. Trust, clarity of purpose and relationship building are key to avoiding the perception that researchers "collect data and go". It is also important that teachers and students are supported in the acquisition of research skills so that they have the option to explore themselves when appropriate, they are not reliant on external researchers and they are able to evaluate the quality of the research they encounter. We have highlighted the need to address issues of social access and to recognise and draw upon the multiple perspectives that exist within research into ESD. Both of these require different stakeholders in the ESD process to trust other participants, on the one hand in terms of providing and not abusing access and on the other recognising that constructive dialogue is essential, particularly where there are conflicting views. John Locke stated that trust is the bond of society (Hollis, 1998) and it could be suggested that it is the key to addressing the disconnections in research into ESD.

Trust is multi-faceted in the way it influences our ability and willingness to act. Newell and Swan (2000) suggest three types of trust that emerge within a research project and are relevant to ESD. Companion trust is based upon close interpersonal bonds and relates to high level principles, or 'moral foundations'. The establishment of companion trust is likely to be slow, and when threatened or destroyed, causes the "greatest rift between the parties involved" (Newell and Swan, 2000, p. 1295).

This type of trust is of particular importance in cultures that are based upon the establishment and maintenance of close personal relations. For example economic development among small businesses in Northern Italy is grounded in tight family ties and social networks, the breakdown of which would often be irrecoverable. Elsewhere, for example within Northern Europe and North America, there is more of an emphasis upon professional ‚competence' as the basis for economic relations. Competence trust, therefore, is the perception of expertise and the associated confidence in the ability of an individual, group or organisation to undertake specific tasks. Trust in competence does not only relate to human skills per se but can refer to the structures and procedures that are formulated by people. For example, where performance measures are felt to be inappropriate or unachievable then trust in them can evaporate and strategies formulated to by-pass or falsify them. Within multi-agency research for ESD the need to establish relationship trust is extremely important because it can facilitate a feeling of allegiance to the project in which individual opinions are of more significance than disciplinary background. Obviously this has to be mediated by the ability to act with professional competence, albeit in a questioning manner, in terms of specific disciplines.

Finally, commitment trust indicates a contractual relationship (e.g. work and remuneration) and a willingness to put in the required effort to ensure reward, material and otherwise. There is flexibility on both sides with regard to the contractual agreement and it is only in extreme cases where trust has irreconcilably broken down that the contract is used to settle conflicts. It is important to recognise the reciprocal nature of trust and the possibility that the nature of that reciprocity might refer to different types of trust; this is relevant both to the focus of the research and to the management of the research process. For example the competence shown in the pursuit of a particular task e.g. running a training workshop, may well be in part dependent upon the personal relationship between the person or organisation responsible for running the workshop and the person or organisation employing them to undertake the task. This relationship will obviously be damaged if the workshop is not delivered with the expected level of competence. Consideration of competence also relates to the knowledge and skills that researchers, and potentially teachers and practitioners, need to acquire for 'managing', learning about, and adapting to, continually changing contexts. The next section will consider these skills and set them within a research and learning context that accepts uncertainty and messiness and is cautious about the pursuit of solutions and predictions.

DISCIPLINARITY: KNOWLEDGE AND SKILLS FOR RESEARCH INTO ESD

Workshop discussion:

- *How can an ESD researcher be more flexible and adaptive?*
- *Need to consider how to combine collaborative (participatory) action research and traditional research.*
- *Qualitative and quantitative research may also need to be integrated in this process.*
- *Introduce researchers and students to action research and facilitator skills.*
- *There is a need to recognise that sustainable development is a process of social learning.*

One cause of the disconnect between research, teaching and practice of ESD is the bounding of problems by, and often the linking of job descriptions and opportunities for career progression, to specific disciplines. The disciplinary approach and the organisational structure of higher education institutions (HEIs) are often seen as a major barrier to the integrative pursuit of more SD (Verhulst and Lambrechts, 2015). Dealing with the complexity of SD issues poses additional theoretical and methodological challenges. Disciplinary expertise is undoubtedly essential for addressing specific and clearly bounded problems but, as discussed above, the clarity of these boundaries can often only be realised following a holistic exploration of the 'mess' of the problem or issue being considered. All the different approaches to understanding a problem carry baggage – good deductive science often tells us little about context but a qualitative narrative does not, and cannot, provide theoretical clarity and statistical validity. For example, research into the community response to water quality needs to understand the chemical impact of pollutants in a watercourse and the reasons for them arriving there. The chemistry and industrial processes of the former are inextricably linked to the organisational, economic and cultural influences on the latter. The narrative is the whole story; to understand one without the other is often not helpful but while good physical science and good social science are both important it is the integrative capability that should underpin the narrative, complement the disciplinary expertise and collectively contribute to a holistic understanding.

However, it should be recognised that the 'whole' problem refers to viewing the system as a whole, not attempting to solve the whole problem. Furthermore, we do not and cannot know what the future holds. SD issues are always uncertain. Teaching, research and practice operate in an increasingly interconnected, complex and messy world. This summarises a number of epistemelogical and pedagogic questions arising from the previous discussion:

- Should we focus on what is sustainable, but will almost inevitably change as a result of that knowledge, or should we learn to anticipate more effectively what might be unsustainable and identify the skills and resources necessary to deal with this?
- How do we adopt, assimilate and communicate a whole systems approach to complex phenomena (e.g. Sterling, 2009)?
- How do we think about such systems systematically?
- What competences can help us address the systems approach and uncertainty issues?

RESEARCH IMPACT, TRANSDISCIPLINARITY AND HEI RESTRUCTURING

Workshop discussion:

- *How can we deal with the tension between theoretical frameworks ("ivory tower") and reality/practice and develop a more blended integration of research and practice?*
- *How can we develop a pedagogy for school community collaboration and in so doing create spaces for new forms of knowledge creation within a post-normal science?*
- *Evaluation of ESD research should not only be based on impact factors but on the feedback from those affected by the research (i.e. the community).*
- *We need to adapt how we report and share research, e.g. co-creation, Regional Centres of Excellence (RCE's); involvement of teachers and students as research evaluators.*
- *Academic journals could include the impact of the reported project in their evaluation of articles.*
- *New ways could be introduced to organise conferences and teaching; these would involve stakeholders.*
- *By extension universities and research institutions should benefit, and be operated in collaboration with, the local community (e.g. see the Square Mile in Leicester, DMU, 2015).*

In the light of the disconnects and pedagogic barriers some key, interlinking, challenges can be identified facing researchers in Higher Education Institutions (HEI's). Firstly, the tension between traditional science and more interpretivist approaches has been highlighted but also seen as the basis for a fundamental synergy that is necessary for exploring, and addressing, complex sustainability issues. Flyvbjerg (Flyvbjerg, 2001; Flyvbjerg et al., 2012) provides an insightful perspective into how social science needs to avoid replicating the experimental and deductive approach

of natural and physical sciences. Within the context of ESD the insight from inductive, interpretive and participative social science is complementary to, not in conflict with, the physical and natural sciences. This leads into an additional challenge highlighted in the workshop; how to ensure that the research has impact? This is becoming an increasingly important component of Higher Education metrics (e.g. within the Research Excellence Framework (REF) in the UK) and encourages revisiting some earlier work in management science. Gibbons et al. (1994) differentiate between Mode 1 problems which are clearly defined and addressed through traditional, disciplinary approaches while Mode 2 are contextual, applied and accountable, in other words they have the potential for impact. Engaging with multiple stakeholders in complex ESD contexts, even if that engagement is primarily pedagogic rather than action based i.e. through the transfer of practical skills and or communicating new ways of exploring an issue, does mean that researchers can impact by being a part of the process they are investigating (Reason and Bradbury, 2001).

These initial challenges lead us directly into questioning how multi- and transdisciplinary studies can be fitted into a disciplinary based higher education system. Before considering this it is worth differentiating multidisciplinary approaches, as those which operate between, and draw upon, different disciplines; and transdisciplinary approaches which essentially works across the disciplines (Waas et al., 2012). Transdisciplinarity, as interpreted in this chapter, is complementary to multidisciplinarity and is characterised by a set of skills and attributes that should be made available to all stakeholders, i.e. teachers, students, researchers, practitioners and community participants. As impact becomes more important to HEI's it is possible that new 'issue' oriented research structures and centres will be introduced; such centres are becoming more common e.g. for natural resource management, for health and wellbeing, and this is reinforced by the opportunities that are generated by virtual centres which have access to a range of researchers, albeit from disciplinary based groups and departments. What has not been addressed adequately, and it could be argued that it is still not being so, is the cross agency and cross disciplinary training in transdisciplinary expertise. This calls for an exploration of the links between competences for SD and research competences (Lambrechts and Van Petegem, 2016, in press). Research and sustainability skills (e.g. systems thinking) and some of the conceptual (e.g. postitive feedback) and practical (e.g. diagramming) tools that support them should become part of the curriculum and training for all disciplines; possibly as part of a broad sustainability module or course.

CONCLUSIONS

This chapter has argued that research into ESD takes place in complex, 'real world,' problem contexts that seldom have clear cut 'sustainable' solutions. By extension, if sustainability is seen as an increase in adaptive capability, resilience, we need to be able to anticipate potential futures (i.e. that to which we have not yet been exposed) and to learn from them (Lemon et al., 2014). Issues of place and time need to be acknowledged, as many sustainability challenges are characterised by uncertainty when it comes to timescales and geographical scales. What we think is important for sustainability here and now might not be the case in the in another place in the world nor in the future (Wals, 2015). Committed research into ESD also requires social and physical access, even when this access is not evident (e.g. in isolated communities, Liarakou et al., 2014). Local, cultural, traditional, indigenous knowledge needs to be valued as sources for research. However, even when stakeholders involved in ESD are aware of the multiple perspectives, there's a danger to strive towards consensus, instead of acknowledging and respecting the differences.

The chapter has further argued that disciplinary knowledge and skills are important when it comes to handling sustainability issues, but it is not enough. In order to understand the complexity and uncertainty, holistic mapping of the problem is essential, leading towards a whole systems approach (Sterling, 2009). Because of the complexity of sustainability related issues, research into ESD has to adopt interdisciplinary and transdisciplinary methods that can triangulate and reflect that complexity. Interdisciplinarity means that an intensive collaboration between different disciplines leads to connecting the results in order to analyse a problem or topic together. Transdisciplinarity goes a step further, as it also involves other actors in society (e.g. NGO's, enterprise, etc.) in analysing the problem or topic; and more importantly, requires the acquisition of cross-cutting skills among all stakeholders (e.g. systems thinking, empathic awareness, communication skills). Transdisciplinarity offers opportunities to bridge the gap between research and society and as such must be seen as fundamental to all levels of education (Waas et al., 2012).

A final conclusion is oriented towards the role of the researcher, as he or she has to find a balance between mediation, facilitation and being an 'objective' outsider. This requires new mental models which are issue driven, rather than discipline or function driven, and a shift in the way new researchers are prepared to do research (see on this issue: Lambrechts and Van Petegem, 2016, in press). It requires action oriented and transdisciplinary skills and the recognition that sustainability research will not remain the responsibility of the Higher Education sector but is central to

action and as such should be undertaken by practitioners, and ideally community stakeholders, in the same way that professional researchers may become increasingly engaged in practice. There is therefore likely to be a significant re-defining of the roles played by, and expectations of, different stakeholders in the co-creation of more sustainable, less unsustainable, futures.

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